

WHAT DO  
TRAFFIC CRASHES  
COST?

*Total Costs to Employers by State and Industry.*

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The Network of Employers for Traffic Safety (NETS), is a non-profit organization dedicated to informing employers of the dramatic costs resulting from motor vehicle crashes. NETS assists employers to implement policies, institute on-site employee programs, and conduct community activities that focus on highway safety issues affecting employers' costs.

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## Summary

**M**otor vehicle crash injuries on and off the job cost employers almost \$55 billion in 1994. One-third of this cost resulted from off-the-job injuries to workers and their dependents. Motor vehicle crashes imposed over an \$18 billion health fringe benefit bill on employers. Employer health care (medical) spending on crash injuries was nearly \$9 billion. Another \$9 billion was spent on sick leave and life and disability insurance for crash victims. Off-the-job crash injuries cost over \$14 billion, accounting for 78% of motor vehicle crash health fringe benefit costs. Off-the-job injuries comprised an even larger share of total employer health care spending on crash injuries (88%). To produce profits equal to employer costs of motor vehicle-related injury, employers would need \$547 billion in sales—over four times the annual growth in the U.S. economy.

Employers pay for injuries that occur both on and off the job. In 1994, motor vehicle crashes killed an estimated 2,000 people while they were working and injured 323,000. Over half of the injuries forced people to miss work. Overall, on-the-job crash injuries (fatal and non-fatal) amounted to about 6.2% of all crash injuries.

Employer costs of crashes exceed \$4 billion in each of the nation's two most populous states—California and New York. They are highest in the agriculture, land transportation, heavy construction, and mining sectors. Employer costs of motor vehicle crash injuries vary widely by state and industry. Cost comparisons between states and industries are inadvisable due to differences in injury severity and completeness of reporting.

Managed health care has helped contain escalating medical costs. However, prevention is the only solution to control health care costs arising from injuries. This report shows that by preventing motor vehicle crashes, the potential health care savings are large. Motor vehicle injury costs to employers are reported on a nationwide, state-by-state, and industry basis. The report updates the national estimates of employer costs of crashes presented in *Traffic Safety and Health Care: State and National Estimates of Employer Costs* and adds estimates of employer costs by industry. Cost-conscious employers would be wise to evaluate their potential health care savings from traffic safety programs.

Employers' Motor Vehicle Crash Costs  
(M = Millions, \$ = 9/95 Dollars)

	CRASH INJURIES		
	On-the-job	Off-the-job	All
Health Fringe Benefit Costs	\$ 4,000 M	\$ 14,300 M	\$ 18,300 M
Non-Fringe Costs	20,300 M	4,500 M	24,800 M
<b>TOTAL</b>	<b>\$ 24,300 M</b>	<b>\$ 18,800 M</b>	<b>\$ 43,100 M</b>
Wage-Risk Premiums	\$ 11,600 M	\$ 0 M	\$ 11,600 M

## Methods

A number of different sources were used to develop the estimates. These included the National Highway Traffic Safety Administration's (NHTSA) 1993 and 1994 Fatal Accident Reporting System (FARS); the U.S. Bureau of Labor Statistics' 1994 Census of Fatal Occupational Injuries (CFOI); the National Institute for Occupational Safety and Health's 1980-1989 National Traumatic Occupational Fatalities (NTOF) data; the U.S. Bureau of Labor Statistics' 1993 Survey of Occupational Injury and Illness (SOII); the 1987-1992 National Health Interview Survey, *Economic Costs of Highway Crashes, 1994*; and *The Cost of Injuries to Employers: A NETS Compendium*. Employer crash costs were adjusted to specific states using ratios of state to national costs. Medical and composite item state price adjusters were calculated from the *ACCRA Cost of Living Index*. A wage adjuster was calculated from estimates of personal income per capita by state in the 1995 *Statistical Abstract of the United States*.

## Conclusions

In balancing the goals of competitiveness and goodwill to employees, alternative strategies to cost-cutting become attractive. Traffic safety programs are an alternative to reduce health care expenses without reducing the benefits offered to employees. Savings are potentially as high as \$50,000 per million vehicle miles of travel. Protecting employees from motor vehicle crash injury can be a profitable investment of time and resources.

## What Do Traffic Crashes Cost? Total Costs to Employers by State and Industry.

Recent publicity has focused on corporate layoffs as a cost-cutting tool. Debate has contrasted the "bottom line" with "corporate responsibility." Injuries account for a substantial portion of health-related costs. Cost-conscious employers would be wise to evaluate their potential health care savings from traffic safety programs. This report shows that by preventing motor vehicle crashes, the potential health care savings are large. Motor vehicle injury costs to employers are reported on a nationwide, state-by-state, and industry basis. The report improves on the national and state-by-state estimates of employer costs of crashes presented in *Traffic Safety and Health Care: State and National Estimates of Employer Costs* (DOT HS 808-234). It adds estimates of employer costs by industry.

### Costs Covered by Employers

Employer costs resulting from motor vehicle crashes fall into three categories: Health fringe benefit costs, non-fringe costs, and wage premiums.

Health fringe benefit costs are the costs of fringe benefits paid because of illness and injury. They cover contributions to Workers' Compensation medical and disability insurance, health insurance, sick leave, Social Security disability insurance, life insurance, and private disability insurance, as well as insurance administration and overhead.

Non-fringe costs include motor vehicle property damage and liability insurance, crash-related legal expenses, and the costs of unreimbursed vehicle damage and replacement. In addition, employers pay taxes to help fund police, fire, and ambulance services. Employers also lose productivity when employees suffer injuries preventing them or their co-workers from working at full capacity. Recruitment and training costs can result from deaths and long-term disabilities.

Finally, employers pay wage premiums to workers for accepting risky jobs. Individual workers and their families bear the non-monetary losses associated with workplace injury. This wage premium for risktaking can be viewed as payment in advance for possible future losses. Miller (1990) identifies 30 credible studies showing the amount paid. These values allow economists to estimate quality-of-life losses for injured workers.

### Employer Costs Extend Beyond the Company Door

Employers pay for injuries that occur both on and off the job. In 1994, motor vehicle crashes killed an estimated 2,000 people while they were working and injured 323,000. As Table 1 shows, over half of the injuries forced people to miss work.<sup>1</sup> Overall, on-the-job crash injuries

<sup>1</sup> Lost workday injuries include those resulting in an inability to perform either wage or household work.

**Table 1**

Injuries of Workers and Their Dependents  
Due to Motor Vehicle Crashes in 1994

	INJURIES		
	On-the-job	Off-the-job	All
Fatal	2,000	39,000	41,000
Non-Fatal	323,000	4,893,000	5,216,000
Lost Work Days	171,000	2,593,000	2,764,000
Non-Lost Work	152,000	2,300,000	2,452,000
<b>TOTAL</b>	<b>325,000</b>	<b>4,932,000</b>	<b>5,257,000</b>

(fatal and non-fatal) amounted to about 6.2% of all crash injuries.

The 1994 economic cost of U.S. highway crashes was \$150 billion (Blincoe, 1996). Employers share this cost for medical care, lost wages, travel delay, and vehicle repair with government and insurers. Crash victims and their families suffer all of the quality-of-life losses, which are not costed.

Motor vehicle crash injuries on and off the job cost employers over \$43 billion in 1994 (Table 2) and required them to pay almost \$12 billion in wage-risk premiums.

Nearly half of the total of fringe and non-fringe costs resulted from off-the-job injuries to workers and their dependents.

**Table 2**

Employers' Motor Vehicle Crash Costs  
(M = Millions, \$ = 9/95 Dollars)

	CRASH INJURIES		
	On-the-job	Off-the-job	All
Health Fringe Benefit Costs	\$ 4,000 M	\$ 14,300 M	\$ 18,300 M
Non-Fringe Costs	20,300 M	4,500 M	24,800 M
<b>TOTAL</b>	<b>\$ 24,300 M</b>	<b>\$ 18,800 M</b>	<b>\$ 43,100 M</b>
Wage-Risk Premiums	\$ 11,600 M	\$ 0 M	\$ 11,600 M

## Employers' Health Fringe Benefit Spending

Motor vehicle crashes imposed over an \$18 billion health fringe benefit bill on employers. Employer health care (medical) spending on crash injuries was nearly \$9 billion.<sup>2</sup> The importance of off-the-job injuries to employers interested in

achieving health-related cost savings is illustrated in Table 3. Off-the-job crash injuries cost over \$14 billion, 78% of motor vehicle crash health fringe benefit costs. Off-the-job crash injuries comprised an even larger share of total employer health care spending on crash injuries (88%). Motor vehicle crashes accounted for 5% of employers' health fringe benefit spending (Figure 1).

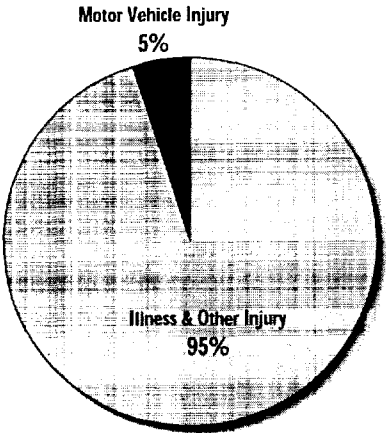
**Table 3**  
Employers' Crash-Related Fringe Benefit Costs  
(M = Millions, \$ = 9/95 Dollars)

	CRASH INJURIES		
	On-the-job	Off-the-job	All
Workers' Compensation	\$ 2,550 M	\$ 0 M	\$ 2,550 M
Medical	820 M	0 M	820 M
Disability	1,730 M	0 M	1,730 M
Health Insurance & Self-Pay	210 M	7,890 M	8,100 M
Disability Insurance	70 M	500 M	570 M
Life Insurance	50 M	530 M	580 M
Insurance Administration	360 M	750 M	1,110 M
Insurance Overhead	180 M	1,150 M	1,330 M
Social Security Disability	120 M	1,440 M	1,560 M
Sick Leave	500 M	2,180 M	2,680 M
TOTAL	\$ 4,040 M	\$ 14,440 M	\$ 18,480 M

## Traffic Safety Programs Can Produce Savings

Employer costs per on-the-job crash, per on-the-job crash injury, and per million vehicle miles of travel enable employers to estimate their injury burden and the potential savings of traffic safety programs. Employers can estimate their cost burden by multiplying the costs in Table 4 by either their total crashes, crash injuries, or millions of vehicle miles of travel.

**Figure 1**  
Motor Vehicle Injury's Contribution to Health Fringe Benefit Costs



Source: Motor vehicle-related injury total from Table 2. Total health-related fringes computed using methods in Miller (1992). See Appendix for details.

<sup>2</sup> Employer health care spending is estimated as the sum of the "Workers' Compensation Medical" and "Health Insurance & Self-Pay" categories.



**Table 4**  
Costs to Employers per On-the-Job Highway Crash  
and Injury per Million Vehicle Miles of Travel  
(M VMT)

	Per Crash	Per Injury	Per M VMT
Health Fringe Benefit Costs	\$ 2,500	\$ 12,300	\$ 10,800
Non-Fringe Costs	12,700	62,500	54,700
<b>TOTAL</b>	<b>\$ 15,200</b>	<b>\$ 74,800</b>	<b>\$ 65,500</b>
Wage-Risk Premium	\$ 7,200	\$ 35,600	\$ 31,300

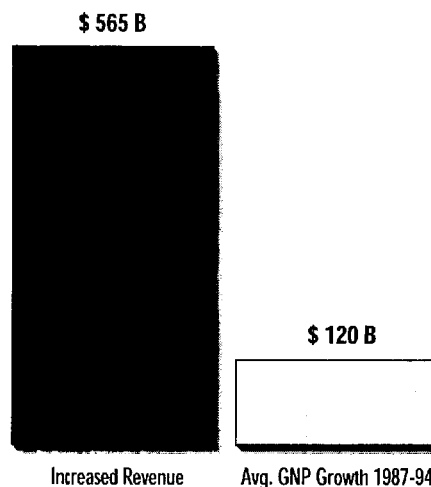
On-the-job highway crashes cost employers \$22,000 per crash, \$97,000 per million vehicle miles of travel (M VMT), and \$110,000 per injury. NHTSA reports that safety elements effective in reducing losses associated with motor vehicle crashes include top-level management commitment to traffic safety programs, mandatory safety belt policies, alcohol and drug non-use policies, Employee Assistance Programs, and safety outreach, extending safety efforts beyond the company door.

A previous Network of Employers for Traffic Safety (NETS) report includes case studies of the savings from traffic safety programs (Miller, 1992). For every million miles of company travel, a safety program can save the company \$50,000.

Employers can also save from programs to prevent off-the-job injury. Family-related interventions can lower health fringe benefit costs. Benefits include a savings of \$85 for each child safety seat (Miller et al., 1993) and \$30 for every bicycle helmet (Miller et al., 1994).

To produce profits equal to employer costs of motor vehicle-related injury, employers

**Figure 2**  
Revenue Needed to Produce Profits Equal to  
Employer Cost of Motor Vehicle-Related Injury



Source: Assumes 10% profit margin. GNP growth computed from the Economic Report of the President, 1996, Tables B-22 and B-58.

would need \$547 billion in sales—over four times the annual growth in the U.S. economy from 1987 to 1994 net of inflation (Figure 2). (This computation assumes that a 10% profit margin is typical of most firms.)

## Employer Costs of Crashes by State

Table 5 details employer costs of motor vehicle crash injuries by state. The methods for calculating state costs are documented in the Appendix. Costs per employee vary widely by state. Cost comparisons between states are inadvisable. Critically, our methods ignore differences in non-fatal injury severity between states. This weakness probably produces cost estimates that are too low in rural states relative to urban states, which typically have lower average speeds and

consequently less severe injuries. Differences between states also may result from differing completeness of reporting of occupational or crash injuries rather than actual differences in injury rates. Cost differences between states may reflect price and income variations more than differences in safety. Finally, differences in labor force participation rates and family size between states could cause employer costs per employee to vary even if safety levels and prices were equal.

### Employer Costs of Crashes by Industry

Employer costs of on-the-job motor vehicle crashes by industry are shown in Table 6. As expected, costs per employee are higher for industries where motor vehicles are used intensively. The highest costs per employee are in agriculture and forestry, land transportation, mining, heavy construction, and automotive sales and repair. Costs were assigned by vehicle type involved in the crash. Heavier vehicles have smaller fatal costs but higher property damage costs. The SOII obtained reports on less than 30% of occupational crash survivors with work loss. We used the reported cases to infer the distribution of unreported cases. Thus, cost variations between industries should be compared cautiously. They may result from differing completeness of reporting.

### Conclusions

In balancing the goals of competitiveness and goodwill to employees, alternative strategies to cost-cutting become attractive. Employer health care (medical) spending for motor vehicle crashes neared \$9 billion in 1994. Another \$9 billion was spent on sick leave and life and disability insurance for crash victims. Traffic safety programs are an alternative to reduce these costs without reducing the benefits offered to employees. Savings are potentially as high as \$50,000 per million vehicle miles of travel. Protecting employees from motor vehicle crash injury can be a profitable investment of time and resources.

**Table 5**  
**Annual Employer Costs of Motor Vehicle Crash Injuries by Expense Category by State**  
(in Millions of 9/95 Dollars)

EXPENSE CATEGORY					EXPENSE CATEGORY				
State	Health Fringe	Non-Fringe	TOTAL	Per Employee	State	Health Fringe	Non-Fringe	TOTAL	Per Employee
USA	\$18,300	\$24,800	\$43,100	\$350	MS	\$151	\$248	\$399	\$340
AK	\$40	\$41	\$81	\$290	MT	\$46	\$58	\$104	\$250
AL	210	297	507	270	NC	548	748	1,296	380
AR	157	216	373	330	ND	26	42	68	210
AZ	301	317	618	330	NE	103	137	240	280
CA	1,793	2,214	4,007	280	NH	50	58	108	180
CO	227	359	586	310	NJ	780	995	1,775	480
CT	259	380	639	390	NM	126	154	280	390
DC	57	46	103	360	NV	128	210	338	460
DE	43	52	95	260	NY	2,124	2,907	5,031	630
FL	1,013	1,336	2,349	370	OH	835	1,059	1,894	360
GA	545	852	1,397	410	OK	213	339	551	380
HI	70	53	123	220	OR	169	222	391	250
IA	155	195	350	230	PA	617	912	1,529	280
ID	67	121	188	340	RI	59	59	118	250
IL	702	885	1,587	280	SC	222	259	481	280
IN	371	704	1,075	370	SD	39	58	97	270
KS	167	343	510	400	TN	317	408	725	290
KY	273	440	713	410	TX	1,408	2,001	3,404	390
LA	329	445	774	440	UT	129	239	368	390
MA	526	514	1,040	350	VA	391	619	1,010	310
MD	341	411	752	290	VT	22	22	44	140
ME	82	91	173	310	WA	427	530	957	380
MI	679	834	1,513	340	WI	287	406	693	260
MN	238	361	599	240	WV	112	137	249	350
MO	344	461	805	310	WY	35	72	107	450

**Table 6**  
**Employer Costs of On-the-Job Motor Vehicle Crashes by Industry**  
 (in 9/95 dollars)

Industry	EXPENSE CATEGORY		Total	Cost Per Employee	Wage Premium
	Health Fringe	Non-Fringe			
Agriculture, Forestry, & Fishing	\$337,639,000	\$1,507,408,000	\$1,845,046,000	\$533	\$1,360,381,000
Mining	\$39,673,000	\$173,999,000	\$213,672,000	\$353	\$168,510,000
Metal Mining	4,284,000	19,529,000	23,813,000	467	17,401,000
Coal Mining	3,448,000	15,718,000	19,166,000	168	14,006,000
Oil & Gas Extraction	27,283,000	122,238,000	149,520,000	441	110,204,000
Non-Metallic Minerals	3,439,000	15,679,000	19,119,000	189	13,971,000
Construction	\$278,016,000	\$1,245,377,000	\$1,523,393,000	\$316	\$998,150,000
General Building Contractors	42,440,000	183,236,000	225,676,000	194	150,097,000
Heavy Construction	91,483,000	385,926,000	477,410,000	661	357,376,000
Special Trades Contractors	143,605,000	675,881,000	819,486,000	271	485,504,000
Manufacturing	\$257,858,000	\$1,253,055,000	\$1,510,913,000	\$84	\$806,742,000
Food & Kindred Products	54,858,000	277,639,000	332,497,000	199	157,587,000
Textile Mill Products	2,627,000	14,690,000	17,318,000	26	5,290,000
Lumber & Wood Products	28,925,000	129,942,000	158,867,000	217	116,867,000
Furniture & Fixtures	4,346,000	25,138,000	29,484,000	59	8,598,000
Paper & Allied Products	4,476,000	21,660,000	26,136,000	38	14,467,000
Printing & Publishing	54,296,000	271,866,000	326,161,000	213	141,094,000
Chemicals & Allied Products	13,867,000	69,163,000	83,031,000	79	40,805,000
Rubber & Misc. Plastics	5,124,000	24,931,000	30,055,000	32	15,559,000
Stone, Clay, Glass, & Concrete	23,845,000	125,576,000	149,421,000	282	68,637,000
Primary Metal Industries	7,241,000	30,754,000	37,995,000	55	27,385,000
Fabricated Metal Products	12,244,000	53,257,000	65,500,000	48	44,465,000
Industrial Machinery & Equip.	14,019,000	70,880,000	84,898,000	44	42,459,000
Electronics	7,676,000	38,272,000	45,948,000	30	16,313,000
Transportation Equipment	13,796,000	66,429,000	80,225,000	46	42,151,000
Instruments & Related Products	4,162,000	22,282,000	26,443,000	31	8,576,000
Miscellaneous Products	1,268,000	7,094,000	8,363,000	22	2,542,000
Transportation & Public Utilities	\$722,203,000	\$3,674,012,000	\$4,396,215,000	\$752	\$2,301,939,000
Local & Interurban Trans.	124,927,000	762,879,000	887,807,000	2,294	281,269,000
Trucking & Warehousing	442,782,000	2,156,445,000	2,599,227,000	1,486	1,564,058,000
Water Transportation	6,963,000	41,264,000	48,227,000	291	13,551,000
Transportation by Air	30,803,000	156,703,000	187,506,000	255	71,627,000
Transportation Services	13,458,000	60,089,000	73,547,000	200	49,224,000
Communications	48,071,000	241,389,000	289,460,000	231	121,425,000
Electric, Gas, & Sanitary Services	51,413,000	252,651,000	304,064,000	330	160,640,000
Wholesale Trade	\$273,798,000	\$1,379,002,000	\$1,652,800,000	\$273	\$748,241,000

**Table 6**  
**Employer Costs of On-the-Job Motor Vehicle Crashes by Industry**  
(in 9/95 dollars)

	EXPENSE CATEGORY				
Industry	Health Fringe	Non-Fringe	Total	Cost Per Employee	Wage Premium
<b>Retail Trade</b>	<b>\$404,473,000</b>	<b>\$2,101,111,000</b>	<b>\$2,505,584,000</b>	<b>\$123</b>	<b>\$1,038,360,000</b>
General Merchandise Stores	18,104,000	97,985,000	116,089,000	47	43,124,000
Food Stores	43,962,000	236,582,000	280,544,000	86	112,383,000
Automotive Dealers	131,939,000	682,239,000	814,178,000	379	319,235,000
Apparel & Accessory Stores	10,672,000	60,382,000	71,054,000	62	21,150,000
Furniture & Home Furnishings	22,085,000	114,144,000	136,229,000	152	54,615,000
Eating & Drinking Places	35,643,000	17,655,000	53,299,000	8	108,379,000
<b>Finance, Insurance, &amp; Real Estate</b>	<b>\$136,458,000</b>	<b>\$725,509,000</b>	<b>\$861,967,000</b>	<b>\$127</b>	<b>\$325,618,000</b>
<b>Services</b>	<b>\$762,290,000</b>	<b>\$4,022,570,000</b>	<b>\$4,784,860,000</b>	<b>\$150</b>	<b>\$1,983,864,000</b>
Hotels	16,295,000	93,375,000	109,670,000	68	32,337,000
Personal Services	29,988,000	166,833,000	196,821,000	173	67,857,000
Business Services	152,205,000	775,613,000	927,818,000	144	434,106,000
Automotive Repair	81,780,000	448,272,000	530,052,000	508	195,726,000
Motion Pictures	1,698,000	9,825,000	11,523,000	24	3,340,000
Amusement & Recreation Services	28,248,000	106,294,000	134,542,000	106	106,418,000
Health Services	258,553,000	1,439,757,000	1,698,310,000	188	573,056,000
Legal Services	15,108,000	86,390,000	101,499,000	108	29,921,000
Educational Services	20,209,000	115,473,000	135,682,000	78	49,846,000
Social Services	93,357,000	519,948,000	613,305,000	273	218,689,000
Membership Organizations	10,625,000	46,957,000	57,582,000	28	42,834,000
Engineering & Management	48,459,000	209,883,000	258,343,000	99	168,586,000
<b>Government</b>	<b>\$729,664,000</b>	<b>\$3,820,229,000</b>	<b>\$4,549,893,000</b>	<b>\$239</b>	<b>\$1,885,813,000</b>
Federal Government	140,925,000	737,826,000	878,750,000	306	364,219,000
State Government	190,172,000	995,663,000	1,185,835,000	261	491,498,000
Local Government	391,916,000	2,051,919,000	2,443,835,000	210	1,012,907,000
<b>TOTAL</b>	<b>\$3,942,070,000</b>	<b>\$19,902,272,000</b>	<b>\$23,844,342,000</b>	<b>\$204</b>	<b>\$11,617,618,000</b>

## Appendix

### Incidence Estimation

We estimated both fatal and non-fatal motor vehicle crash injuries by state and industry.

Our state fatality estimation used three data sets: (1) the National Highway Traffic Safety Administration's (NHTSA) 1994 Fatal Accident Reporting System (FARS), (2) the U.S. Bureau of Labor Statistics' 1994 Census of Fatal Occupational Injuries (CFOI) (see Jack and Zak, 1995), and (3) the National Institute for Occupational Safety and Health's 1980-1989 National Traumatic Occupational Fatalities (NTOF) data (see Jenkins et al., 1993).

To estimate occupational fatalities by state, we used the CFOI fatality count. To reduce the effects of random variation with very small sample sizes, if the CFOI state count was less than nine we used the NTOF average of motor vehicle traffic fatalities (1980-1989). This resulted in an estimated 2,026 U.S. on-the-job motor vehicle fatalities. To get off-the-job motor vehicle-related fatalities, we subtracted the state occupational highway fatality estimates from the 1994 FARS state totals (all ages). (We multiplied the off-the-job fatality estimate by the employer cost per off-the-job fatality averaged over all such fatalities, including fatalities of children, unemployed people, and retirees. We assume that all people under age 65 are workers or dependents.)

To calculate the number of non-fatal occupational injuries, we used four different data sources: the 1993 FARS, the 1994 police-reported state non-fatal injury counts (Blincoe, 1996), the 1993 CFOI, and the National Health Interview Survey

(NHIS) 1987-1992. (The NHIS is a nationwide sample of civilian households. It includes information on injuries, whether they were on-the-job, and where they occurred.)

The number of injured on-the-job motor vehicle crash survivors by state was computed in four stages. We started from state counts of police-reported crash survivors, adjusted for police under-reporting of injury. The police reports documented an estimated 70% of the total injury victims (Blincoe, 1996). From these injury counts and FARS fatality counts, we computed the number of injured crash survivors per crash fatality by state. That ratio was multiplied by the CFOI count of occupational motor vehicle fatalities by state. (This calculation assumes that the percentage of crash fatalities on public roads, 81%, matches the NHIS percentage of on-the-job crash survivors who were injured on public roads.) Finally, the resulting estimates were multiplied by the percentage of injured survivors of motor vehicle crashes on public roads who were injured on the job divided by the percentage of motor vehicle crash fatalities on public roads who died on the job. The percentage of survivors, 5.25%, came from the NHIS. The percentage of deaths, 4.3%, was computed by dividing the CFOI count by the FARS count.

To distribute the injured survivors of on-the-job crashes by industry, we used the SOII distribution of survivors of lost-workday occupational injuries by two-digit Standard Industrial Classification Code. The SOII excludes medically treated survivors without workdays lost, whom the NHIS estimates are 41.5% of the total. It also does not cover all workers. Notably, it excludes government workers and self-employed truck and taxi drivers. (To estimate injury survivors in the government sector, we multiplied the

number of survivors per fatality for the service sector by the CFOI fatality count for government employees.) Beyond its under-coverage problem, the SOII appears to under-count motor vehicle crash injuries. It records only 50,336 of the estimated 195,000 injured survivors of on-the-job crashes.

This update relies on CFOI data to calculate on-the-job motor vehicle fatalities. In previous estimates, the CFOI was used in conjunction with the FARS to estimate on-the-job fatalities. The CFOI has increasingly been accepted as a reliable source of fatality counts. Our reliance on the data results in a drop in the estimated number of occupational fatalities (and the associated costs) from prior reports. The drop does not indicate a trend in the number of fatalities.

Incidence of commercial vehicle crashes used to calculate cost per crash is from a previous Miller study (Miller et al., 1991). The number of commercial vehicle crashes was 1,595,000. Twenty percent of these crashes caused injuries.

Commercial vehicle miles traveled were estimated from two sources. Total vehicle miles traveled in 1994 (2,347 billion) is from *Traffic Safety Facts, 1994*. The percentage of vehicle miles driven by commercial vehicles (15.8%) was calculated from the *Nationwide Personal Transportation Survey, 1990*. This percentage was multiplied by the 1994 total number of vehicle miles traveled for an estimate of 371 billion commercial vehicle miles traveled in 1994.

## Cost Estimation

Medical, productivity, emergency services, property damage, legal, and non-liability insurance claims processing costs were

estimated with SOII occupational injury survivor counts by vehicle type occupied or pedestrian status and costs per crash victim by vehicle type occupied or pedestrian status from Miller et al. (1996). The costs then were distributed into more detailed categories with the distribution in Miller (1992). Other costs per case and costs in Table 4 are from Miller (1992). These costs were inflated to 1995 dollars using inflators (medical spending per capita, employment cost index, and consumer price index — all items) calculated from the 1996 *Economic Report of the President*. Employer crash costs were adjusted to specific states using ratios of state to national costs. The medical and composite state price adjusters were calculated from the *ACCRA Cost of Living Index*. The wage adjuster was calculated from estimates of personal income per capita by state in the 1995 *Statistical Abstract of the United States*. Costs per employee in Table 5 were calculated using the number of employees by state from Table 626 of the 1995 *Statistical Abstract of the United States*.

Societal crash costs are updated from Blincoe and Faigin (1992) and Miller (1992) using the refinements from Miller (1993). Average growth in GNP was computed from Tables B-23 and B-59 of the 1996 *Economic Report of the President*.

Total employer health fringe benefit costs (Figure 1) were computed following the methods in Miller (1992). Sources of data were as follows: sick leave, from Table 683, 1995 *Statistical Abstract of the United States*, and Table B-25, 1996 *Economic Report of the President*; workers' compensation, from Table 604, 1995 *Statistical Abstract of the United States*; disability insurance, from Table 586, 1995 *Statistical Abstract of the United States*; health insurance, from Table 156, 1995

*Statistical Abstract of the United States*; life insurance, from Table 845, 1995 *Statistical Abstract of the United States*, and Table 6 (Methods) in Miller (1992); and Social Security disability insurance, from Table 593, 1995 *Statistical Abstract of the United States*.

Costs in Table 6 were assigned to non-fatal injuries by vehicle type. These costs were determined in a recent analysis of highway crash costs (Miller et al., 1996). Fatal crash costs were assigned on a per case basis. The number of employees by industry came from Table 668 of the 1995 *Statistical Abstract of the United States*. The wage-risk premium was calculated as an average per worker across all industries. Wage-risk premiums are implicit costs to employers to compensate workers for increased risk levels. Since the premiums are implicit and not a direct monetary cost, they were separated from the other costs.

This year's report employs new methods to cost motor vehicle crashes to employers. The methodology was changed to clean up problems in using average costs per injury. Instead, we assigned costs by vehicle type involved in the crash. By adjusting to vehicle type, we more accurately estimated the cost of motor vehicle crashes to employers. As a result, increases to health fringe and non-fringe costs will change by different magnitudes. The most noticeable difference from previous estimates is the decrease in the wage-risk premium. This is attributable to a separate estimate of commercial vehicles used on the job. Commercial vehicles have a lower average non-fatal injury severity and cost than non-commercial vehicles. Thus, average costs and total wage-risk premiums are lower than the all-vehicle average used in prior years.



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